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US 6,335,718

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1) 10/747,819 - US 6335718

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1

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FAN - 20063140231610

PN - GB9910383 D0 19990707 [GB9910383]
      GB2345423 A 20000705 [GB2345423]
      KR20000046659 A 20000725 [KR20000046659]
      JP2000207077 A 20000728 [JP2000207077]
      GB2345423 B 20010829 [GB2345423]
      US6335718 B1 20020101 [US6335718]

TI - Data transmission apparatus and method

PA - LG LCD INC
      LG PHILIPS LCD CO LTD

PA0 - LG. Philips LCD Company, Ltd., Seoul [KR]

IN - HONG JIN CHEOL; SONG HONG SUNG

AP - 1998KR-0063372 19981231; 1999US-0299533 19990426; 1999GB-0010383
      19990505; 1999JP-0169026 19990615

PR - 1998KR-0063372 19981231

IC - G06F-003/00
      G06F-003/14
      G06F-013/38
      G09G-003/20
      G09G-003/36
      H04L-025/08
      H04L-025/49

ICAA - G06F-003/00 [2006-01 A F I R M JP]; G06F-003/14 [2006-01 A - I R M EP];
      G06F-013/38 [2006-01 A L I R M JP]; G09G-003/20 [2006-01 A L I R M JP];
      G09G-003/36 [2006-01 A L I R M JP]; H04L-025/08 [2006-01 A - I R M EP];
      H04L-025/49 [2006-01 A - I R M EP]

ICCA - G06F-003/00 [2006 C F I R M JP]; G06F-003/14 [2006 C - I R M EP]; G06F-
      013/38 [2006 C L I R M JP]; G09G-003/20 [2006 C L I R M JP]; G09G-003/36
      [2006 C L I R M JP]; H04L-025/08 [2006 C - I R M EP]; H04L-025/49 [2006 C
      - I R M EP]

PCL - ORIGINAL (O) : 345098000; CROSS-REFERENCE (X) : 345087000
      345100000 345600000 345605000

FI - G06F3/00 X; G06F13/38 320A; G09G3/36; G09G3/20 633D

FTM - 5B077 AA45; 5B077 FF11; 5C006 AA01; 5C006 AA22; 5C006 AF61; 5C006
      BB11; 5C006 BF06; 5C006 BF14; 5C006 BF16; 5C006 BF22; 5C006 BF26;
      5C006 BF27; 5C006 FA32; 5C006 FA47; 5C080 AA10; 5C080 BB05; 5C080
      DD12; 5C080 DD26; 5C080 FF09; 5C080 JJ02; 5C080 JJ03; 5C080 JJ04

CT - (US6335718)
      US5748902; US5917364; EP0069183; EP0228528; JP9-233146; JP10-190751;
      WO9209162; WO9713347; WO9713348
      Brochure from Crystal, A Cirrus Logic Company, Flat Panel Electronics--EMI
      Reduction Features DTR Block Diagram.

CT - (GB9910383)
      Cited in the search report

EP69183(A1);EP228528(A1);JP90233146(A);JP100190751(A);US5748902
(A);US5917364(A);WO9209162(A1);WO9713347(A2);WO9713348(A2)

CT   -   (JP2000207077)
[19] Citation as reason for refusal of an application
JP (A) 1996304763 [JP08304763]
JP (A) 1998190751 [JP10190751]

AB   -   (US6335718)
A data transmission apparatus a data transmitter selectively inverting data and
transmitting the selectively inverted data. A data receiver selectively re-inverts
the selectively inverted data from the data transmitter and reconstructs the
inverted data into the original data. The inversion operation of the data
transmitter and the data receiver is controlled by a mode controller. The mode
controller receives data having a number of bits along with a clock signal to
detect a number of transitions every period of the clock signal, and controls
driving modes of the data transmitter and the data receiver in accordance with
the detected number of transitions.

OBJ -   (US6335718)
This invention relates to a data transmission apparatus and method for
transmitting parallel data and, more particularly, to a liquid crystal display device
employing the data transmission apparatus.
Accordingly, the present invention is directed to a data transmission system that
substantially obviates one or more of the problems due to limitations and
disadvantages of the related art.
An object of the present invention is to provide a data transmission apparatus
and method that are suitable for minimizing EMI and optimizing power
consumption.
Another object of the present invention is to provide a liquid crystal display
device that minimizes EMI and optimizes power consumption.
A further object of the present invention is to provide a computer system that
minimizes EMI and optimizes power consumption.
In another aspect of the present invention, a data transmission includes the steps
of receiving a data having a plurality of bits along with a synchronous clock to
detect a transition amount of the data every period of the synchronous clock and
generating a mode control signal having a logical value changing in accordance
with the detected transition amount; responding to the mode control signal to
selectively invert the data and transmitting the inverted data; and responding to
the mode control signal to selectively invert the selectively inverted data and to
reconstruct the inverted data into the original data.
In another aspect of the present invention, a liquid crystal display device includes
a mode controller for receiving video data having a plurality of bits to detect a
transition amount between nth video data and (n-1)th video data and for
generating a mode control signal having a logical value changing in accordance
with the detected transition amount, said n being an integer; a data transmitter,
responsive to the mode control signal, for selectively inverting the nth video data
and transmitting the inverted video data; and a data receiver, responsive to the
mode control signal, for selectively inverting the selectively inverted video data
from the data transmitter to reconstruct the inverted video data into the original
video data.
In another aspect of the present invention, a computer system includes a mode
controller for receiving video data having a plurality of bits from a video card to

detect a transition amount between nth video data and (n-1)th video data and for generating a mode control signal having a logical value changing in accordance with the detected transition amount, said n being an integer; a data transmitter, responsive to the mode control signal, for selectively inverting the nth video data and transmitting the inverted video data; and a data receiver, responsive to the mode control signal, for selectively inverting the selectively inverted video data inputted, via a transmission line, from the data transmitter and for reconstructing the inverted video data into the original video data.

In a further aspect of the present invention, a computer includes a mode controller for receiving video data having a plurality of bits from a video card to detect a transition amount between nth video data and (n-1)th video data and for generating a mode control signal having a logical value changing in accordance with the detected transition amount, said n being an integer; a data transmitter, responsive to the mode control signal, for selectively inverting the nth video data and transmitting the inverted video data; and a data receiver, responsive to the mode control signal, for selectively inverting the selectively inverted video data inputted, via a transmission line, from the data transmitter and for reconstructing the inverted video data into the original video data and outputting the reconstructed video data to a data driver.

ADB - (US6335718)
The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, a data transmission apparatus according to an embodiment of the present invention includes a mode controller for receiving a data having a plurality of bits along with a synchronous clock to detect a transition amount of the data every period of the synchronous clock and for generating a mode control signal having a logical value changing in accordance with the detected transition amount; a data transmitter, responsive to the mode control signal, for selectively inverting the data and transmitting the inverted data; and a data receiver, responsive to the mode control signal, for selectively inverting the selectively inverted data from the data transmitter to reconstruct the inverted data into the original data.

Such a data transition causes an increase in power consumption at each output stage.

ICLM - (US6335718)
1. A data transmission system comprising:
a mode controller receiving first data having a plurality of bits and outputting a first control signal in accordance with a number of data transitions of the plurality of bits of the data;
a data transmitter coupled to the mode controller and outputting second data corresponding to the first data in response to the first control signal from the mode controller; and
₰a data receiver coupled to the data transmitter and outputting third data corresponding to the second data in response to a second control signal corresponding to the first control signal.
16. A data transmission system for a computer comprising:
a main control unit including:
- a video card outputting first data;

- a mode controller receiving first data having a plurality of bits and outputting a
first control signal in accordance with a number of data transitions of the
plurality of bits of the data; and
- a data transmitter coupled to the mode controller and outputting second data
corresponding to the first data in response to the first control signal from the
mode controller; and
a display unit coupled to the main control unit including:
- a data receiver coupled to the data transmitter and outputting third data
corresponding to the second data in response to a second control signal
corresponding to the first control signal; and
- data driver coupled to the data receiver and receiving the third data.
19. A liquid crystal display device having a data transmission system
comprising:
a mode controller receiving first data having a plurality of bits and outputting a
first control signal in accordance with a number of data transitions of the
plurality of bits of the data;
a data transmitter coupled to the mode controller and
outputting second data corresponding to the first data in response to the first
control signal from the mode controller; and
a data receiver coupled to the data transmitter and outputting third data
corresponding to the second data in response to a second control signal
corresponding to the first control signal.
34. A computer comprising:
a main control unit including:
- a video card outputting first data;
- a mode controller receiving first data having a
- plurality of bits and outputting a first control signal in accordance with a
number of data transitions of the plurality of bits of the data; and
- a data transmitter coupled to the mode
- controller and outputting second data corresponding to the first data in response
to the first control signal from the mode controller; and
a display unit coupled to the main control unit including:
- a data receiver coupled to the data transmitter and outputting third data
corresponding to the second data in response to a second control signal
corresponding to the first control signal; and
- data driver coupled to the data receiver and receiving the third data.
37. A method of transmitting data comprising the steps of:
receiving first data having a plurality of bits and
outputting a first control signal in accordance with a number of data transitions
of the plurality of bits of the data;
outputting second data corresponding to the first data in response to the first
control signal; and
outputting third data corresponding to the second data in response to a second
control signal corresponding to the first control signal.
38. A data transmission apparatus, comprising:
a mode controller for receiving a first data having a plurality of bits and a clock
signal to detect a number of transitions of the first data corresponding to the
clock signal and for generating a mode control signal having a logic value
changing in accordance with the number of transitions;
a data transmitter, responsive to the mode control signal, for selectively inverting
the first data and transmitting the inverted data; and

a data receiver, responsive to the mode control signal, for selectively inverting the selectively inverted data from the data transmitter to reconstruct the selectively inverted data into the first data.

39. A data transmission method comprising the steps of:

receiving a first data having a plurality of bits and a clock signal to detect a number of transitions in the first data corresponding to the clock signal and generating a mode control signal having a logic value changing in accordance with the number of transitions;

selectively inverting the first data in response to the mode control signal and transmitting the inverted data; and

selectively inverting the selectively inverted data in response to the mode control signal and reconstructing the inverted data into the first data.

40. A liquid crystal display device having a data driver for driving a liquid crystal panel, comprising:

a mode controller for receiving video data having a plurality of bits to detect a number of transitions between a first video data and a second video data and for generating a mode control signal having a logic value changing in accordance with the number of transitions;

a data transmitter, responsive to the mode control signal, for selectively inverting the second video data and transmitting the selectively inverted video data; and

a data receiver, responsive to the mode control signal, for selectively inverting the selectively inverted video data from the data transmitter to reconstruct the inverted video data into the second video data.

41. A computer system including a liquid crystal display device and a video card for producing video data to be supplied to the liquid crystal display device, said system comprising:

a mode controller for receiving video data having a plurality of bits from the video card to detect a number of bit transitions between a first video data and a second video data and for generating a mode control signal having a logic value changing in accordance with the number of bit transitions;

a data transmitter, responsive to the mode control signal, for selectively inverting the second video data and transmitting the selectively inverted video data; and

a data receiver, responsive to the mode control signal, for selectively inverting the selectively inverted video data inputted, via a transmission line, from the data transmitter and for reconstructing the inverted video data into the second video data.

UP   -   2002-03

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1 / 2 LGST - ©EPO

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AP   -   US29953399 19990426 [1999US-0299533]

ACT   -   20040330 US/RF-A
                REISSUE APPLICATION FILED
                EFFECTIVE DATE: 20031230

UP   -   2004-15

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ACT -   19991124 GB/COOA-A
CHANGE IN APPLICANT'S NAME OR OWNERSHIP OF THE
APPLICATION
UP   -   2003-22

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1 / 1   CRXX - ©CLAIMS/RRX

PN   -   6,335,718 A 20020101 [US6335718]
PA   -   LG Philips LCD Co Ltd KR
ACT -   20031230 REISSUE REQUESTED
ISSUE DATE OF O.G.: 20040330
REISSUE REQUEST NUMBER: 10/747819
EXAMINATION GROUP RESPONSIBLE FOR REISSUEPROCESS: 2674

Reissue Patent Number:

Search statement   10

UNITED STATES PATENT AND TRADEMARK OFFICE GRANTED PATENT

6335718

January 1, 2002

Data transmission apparatus and method

APPL-NO: 299533 (09)

FILED-DATE: April 26, 1999

GRANTED-DATE: January 1, 2002

CORE TERMS: video, bit, transition, control signal, transmitter, receiver, controller, selectively, interface, inverted ...

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Patent Search 6335718 6/4/2007

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